

## Contributions of the Torrey Botanical Club to the Development of Taxonomy\*

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Travel back in your mind to 1867. Andrew Johnson occupies the White House at Washington. Carpet-baggers are rampant in the South. Boss Tweed has his thumb on the city of New York. Millions of buffalo graze the plains of Kansas. The first transcontinental railway has not been completed.

And what of science in this country? Botany is still regarded as a proper subject of study in a ladies' seminary. Of plant physiology there is none, although a young Maine physician, George Goodale, may be musing on the subject. Of plant pathology there is none, although a country school teacher, Charles Peck, a storekeeper, Benjamin Everhart, and a farmer, Job Ellis, are actively collecting fungi, and a young medical student, William Farlow, is beginning an interest in the subject. Of genetics there is none, although there is a great deal of talk about a recent book called the Origin of Species. No ordinary college student has yet peeked through a microscope as a part of his regular classwork, but a sophomore at Michigan Agricultural College, Charles Bessey, is wishing that he could and a few years later gave the opportunity to his own students.

In taxonomy conditions are very different. Three distinguished botanists stand out above all the rest for their taxonomic research, Gray of Cambridge, Torrey of New York, and Engelmann of St. Louis, although measured by influence on the teaching and study of botany and consequently by their inspiration of another generation, Torrey and Gray must divide their honors with another New York man, Alphonso Wood. The plants of the eastern states are already thoroughly known and no one gives much attention to this region. In the south Chapman is still discovering undescribed species, and in the unsettled and largely uncivilized west several adventurous botanists are sending east large quantities of new material to Gray, Torrey and Engelmann.

In New York, Professor Torrey was the only research botanist, but there were several young folks who were interested in plants, who liked to tramp over the hills, along the beaches, or through the pine barrens. These young folks met with Professor Torrey, exhibited their botanical treasures, recounted the adventures of their trips, and rejoiced together over the collection of some uncommon species. Torrey did not encourage them to work for a doctor's degree or require them to register for formal courses in botany. He did not advise them to explore the jungles of the tropics, where new species could

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be found, or to monograph the genus *Carex*. Wise in proportion to his years, he knew that good taxonomists can develop but can not be forced, and he probably felt and hoped that from such a group there might arise from time to time a few taxonomists who, through their deep interest, their keen observation, and their taxonomic curiosity, would really contribute to the advancement of science. He, therefore, neither overwhelmed them with his own knowledge nor belittled their own amateur work, but listened patiently to the accounts of their adventure, praised them for their discoveries, and by his geniality and interest encouraged them to further study. These were the men who organized themselves into the Torrey Botanical Club in 1867.

After the death of Torrey, the Club was left to stand or fall on its own merits. During the seventies it was held together partly by the common interest of its members, which could be expressed in meetings and field excursions, and partly by the responsibility of publishing the *Torrey Bulletin*.

As the first contribution which the Torrey Club has made to taxonomy, we naturally think of its publications. For many years the largest item in the budget of the Club has been for the production of the *BULLETIN*, the *MEMOIRS*, and *TORREYA*. And as the Club has been generous, so have taxonomists, not only the members of the Club but non-members as well, been fortunate in finding in it a dignified and reputable means of presenting their results to the world.

Those who have had occasion to look through the early volumes of the *BULLETIN* know that the membership of the Club was originally composed almost entirely of amateur taxonomists, of young men interested in the local flora, and that Dr. Torrey was the only professional taxonomist in the group. From the pens of these young men came a series of short notes, almost all taxonomic or floristic in nature and most of them very amateurish. Some of them soon graduated into actual research work; among them T. F. Allen and C. F. Austin, who began during the seventies to publish critical discussions and descriptions of new species of *Chareae* and *Hepaticae*.

The *BULLETIN* soon began to attract the attention of other American botanists, and during the seventies and early eighties its pages contain contributions from such well-known men as F. L. Collins, A. H. Curtis, J. B. Ellis, George Engelmann, Asa Gray, Charles H. Peck, John Donnell Smith, William Trelease, L. M. Underwood, and Francis Wolle. As its circulation grew, so did the length and importance of its articles. Little by little the local observations disappeared and were replaced by sober research, until during the eighties and nineties it had become without doubt the leading American outlet for the publication of taxonomic research. To supplement the *BULLETIN* and to provide for longer articles, the *MEMOIRS* were established in 1889 and have given the bulk of their pages also to taxonomy. *TORREYA* was established

in 1901, primarily for a revival of opportunity for the discussion of local botany, but it also has given a fraction of its space to taxonomic research.

As a matter of statistics, it may be recorded that to the end of 1941, the Club has published a total of 22,098 pages of printed matter devoted to pure taxonomy or to cognate subjects primarily of interest to taxonomists. I feel certain that this impressive total is not approached by any other American magazine during the same three-quarters of a century.

In the preparation of this paper, I have leafed through the publications of the Club and have compiled two graphs showing the amount of taxonomic publication year by year, and the proportion, expressed in percentage, of the total publication which has been devoted to taxonomy. In doing so I have often had to make hasty judgments as to the taxonomic or non-taxonomic classification of an article, and I have also tried to take into account the general nature of the membership of the Club and of its audience at the different periods in its history. Consequently I have included in taxonomy many short articles from the early volumes which, if printed today, would be regarded merely as interesting notes of no special botanical value. The resulting graphs, to revive an ancient New York simile, were as crooked as Pearl Street and their general trend was badly obscured by the huge annual fluctuations. For presentation today I have smoothed them out severely so that neither the highest peaks nor the lowest depressions now appear. These graphs speak for themselves and require little comment or explanation (Fig. 1).

The first curve shows the number of printed pages in the Club's publications which have been used for taxonomy. It shows the feeble results of the Club's activities during its struggling first decade; the rapid rise of taxonomy in the nineties, as Britton and Rusby came into action and as the BULLETIN became a national rather than a local organ; the huge productivity in taxonomy at the turn of the century when those active young men Britton, Small, and Rydberg were at their best; and the gradual decrease in total taxonomic matter in the last three decades as space became available in several new publications. Since the curve is smoothed it does not show the peak of publication, which was 932 pages in 1906, nor the lowest point of the last half century, which was 101 pages in 1926.

The second curve shows the percentage of total publication which has dealt with taxonomy. It shows the almost exclusively taxonomic interests of the membership in the early days of the Club, followed by twenty years of gradual diversification; a temporary rise over another twenty years, as the unparalleled productivity of New York botanists overbalanced the generally growing interest in morphology and physiology; a general period of decline during the next thirty years, as the interests of the members became more diversified:

and finally a rise in the proportion during the last decade, doubtless in response to the general revival of interest in taxonomy.

The magnitude and importance of the Club's contribution to the advancement of taxonomy by means of its publication is, I am sure, realized and appreciated by all taxonomists, and I trust that my figures have served to make it clear to the non-taxonomic members of the audience.

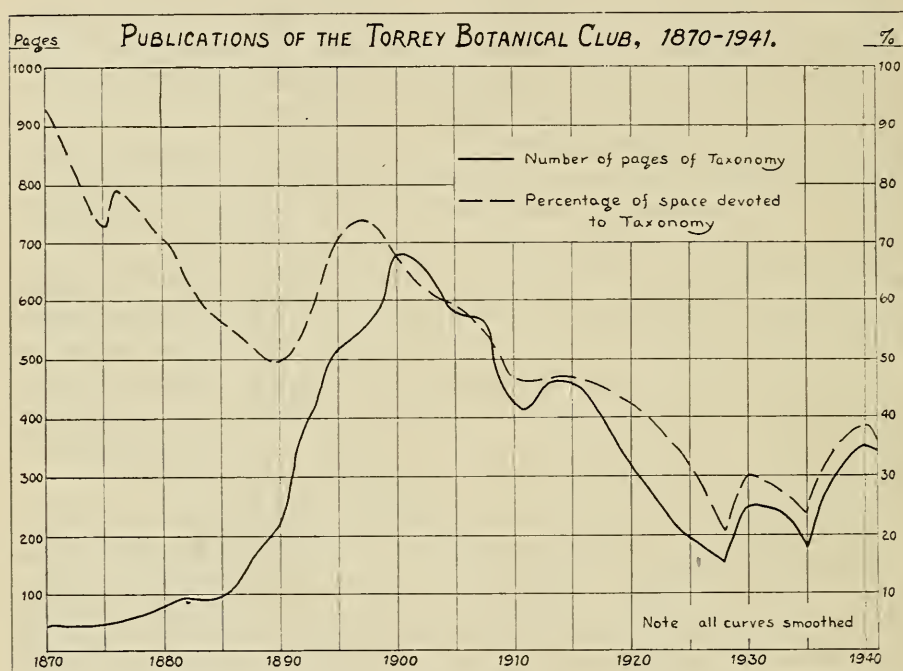


FIG. 1

As a second and minor contribution I may mention the development of the Torrey Club herbarium. Begun so long ago that I fail to find the date of its inception, this herbarium grew very gradually through the donations of the local members. Not long after the Museum Building of the Botanical Garden was completed the herbarium was transferred to it, and continued to expand through the voluntary activity of interested local botanists and through the collections of the Garden staff. The Club then presented the herbarium to the Botanical Garden and it has since been maintained as a separate unit, covering the area known as the Torrey Club range, which is roughly all the territory within a hundred miles of New York, and illustrating the flowering plants and ferns of this region by some 65,000 mounted specimens. The



herbarium may be consulted by any person interested in the local flora, which is almost completely represented.

A botanical club, considered as a unit, can of course do no research, and the Torrey Club has not employed taxonomists for research nor given grants in support of it. Besides the two contributions to taxonomy which I have already mentioned, is there any other way in which the Torrey Club can be or has been of genuine service? There is a third way, which may not occur to you immediately, in which the Club has been active, and through which, measured by the extent and importance of the results, the Club has rendered a highly valuable service, a service which has been partially outmoded by the changed conditions of the twentieth century, but for which there is still an opportunity and a demand. I refer to the encouragement and inspiration of botanists. Botanists, like poets, are born, not made, but after birth they must be developed. Today we have colleges and graduate schools for that purpose, but such was scarcely the case in New York in the seventies and early eighties. Even a formal education is not always sufficient. Probably every one of us can look back to our earlier years and remember the inspiration which we received from some one botanist, an inspiration which may have determined us to become botanists rather than to enter some other profession.

Obviously, the professional botanists of New York today were not made into botanists because of the influence of the Torrey Club, nor do they remain botanists for that reason. Conditions were different sixty or seventy years ago, when the death of Dr. Torrey left the Club without a leader and the botanical interests of its members were kept alive largely through the encouragement of mutual contact, through the emulation of their fellow-members, through the stimulation of new ideas, through the applause for the work they accomplished.

There are some professions which can easily demand one's full time, leaving no opportunity for a hobby; there are some which offer excellent opportunities for productive research to those who are so minded. There are still others in which the prospect of large financial gain acts as a stimulus to continuous work. Financial success, once it has been attained, is also apt to lead one to devote his leisure time to the more fashionable forms of pleasure.

I shall cite to you five men who were trained and educated in a different line, who earned their bread and butter in a different profession, whose interest in botany was merely a young man's hobby, but who maintained this interest throughout their life and in two instances finally made it their life's work. One of these men had political advancement apparently within his reach, but turned from it to enter botany at the bottom of the professional ladder. A second had opportunity for research in a different subject. A third turned from

his original profession into botany before he was thirty. Two achieved financial independence and still remained botanists by avocation.

Surely there was a cause for this continued interest in plants, and I fail to find any plausible cause other than the factor of encouragement and inspiration received through the Torrey Botanical Club. Then, when you hear the results achieved by these men, when you realize the part they have played in the development of American taxonomy and in the provision of taxonomic opportunity for others, you will agree that the most important contribution yet made by the Torrey Club has been the inspiration and encouragement of these men and of others whom I have not time to mention. The five are sufficient to demonstrate my point.

Eugene P. Bicknell, as a boy, was an amateur ornithologist and began publishing in that subject at the early age of eighteen. As a man, he was a banker. It was undoubtedly his membership in the Torrey Club and the stimulus which he derived from it that gradually converted him into a clever botanist. He was an exceedingly careful and discriminating observer of plants in the field, and the bulk of his published work deals entirely with his field studies. He was among the first to take his taxonomy into the field and to base his conclusions primarily on his personal observations and only secondarily on herbarium material. Do not understand from this statement that all his taxonomic predecessors had been exclusively herbarium botanists; nothing would be farther from the truth. But, in general, they had formed their ideas first in the herbarium and then substantiated them in the field, while Bicknell reversed the procedure.

His results were astonishing. Right here in the vicinity of New York, where botanical work had been carried on for a century, he began to discover undescribed species. Eastern botanists were surprised to learn, through his careful field work, that there were more than one species of *Helianthemum* in the vicinity. The common black snakeroot had always been referred to a single species, or to a species and a variety, and Bicknell showed conclusively that there were four. *Scrophularia* had held a single species in the eastern states, and here he found a second. *Agrimonia* had long contained only two accepted species; Bicknell's careful field study showed several others. In rapid succession he turned his attention to other genera, *Carex*, *Sisyrinchium*, *Lechica*, *Asarum*, *Teucrium*, *Rubus*, *Rosa*, and various grasses, and in every case his detailed and complete observations threw new light on their taxonomy. In *Rubus* in particular, he early pointed out that the characters of the microspecies of blackberries are of a different nature from those of the hawthorns, and this observation, based on field study alone, is now being confirmed by cytogenetics.

In short, it was Bicknell, more than any other man of the period, who returned taxonomy to the field and who re-opened the eastern states for taxonomic research. In the great revival of taxonomy during the last quarter-century, our own region has been found a fertile field for investigation. I do not claim that Bicknell was directly responsible for this, but it is obvious that he was followed, not preceded, by such similarly careful field men as Deam, Stone, Wiegand, Marie-Victorin, and Fernald. The Torrey Club may well be proud that it had a part in this development through its encouragement and support of the work of the banker, Eugene Pintard Bicknell.

The second man whom I shall mention was a successful lawyer, a prominent judge in the New York courts, Addison Brown. He was a member of the Torrey Club during the seventies, but being already established in his profession he had less time and opportunity for field work. His botanical work was chiefly centered on the collection of the various kinds of alien plants which appeared on ballast dumps in the vicinity of New York City. His few printed papers, published in the early volumes of the BULLETIN, show that he collected many rare or unusual plants, some of them previously unknown in America. His collecting stations are now mostly covered with buildings and ballast-dumps are a thing of the past, but his specimens, conserved in the herbarium of the New York Botanical Garden, show that his results were accurately reported. Judge Brown's contributions to botany were chiefly financial. It was he who assumed the financial responsibility for the publication of Britton and Brown's *Illustrated Flora*, without which the work could never have been issued. I believe that I am correct in saying that no single book ever did as much as this to revive and stimulate interest in the native flora of the northeastern states and that his willingness to underwrite it derived from his faith in Britton and his personal interest in plants, for both of which the Torrey Club is responsible.

The third man was a geologist, who worked for a short time at mining and then became a sanitary inspector for the City of New York. Interested in politics, deeply concerned with all forms of civic improvement, he was soon taking an active part in the affairs of the city and was appointed to several city positions of increasing dignity and responsibility. In the middle of this career he returned to science, which he had always followed as a hobby, entered the graduate school, received his degree of doctor of philosophy, and became one of the leading paleobotanists of America. Arthur Hollick's name and reputation are familiar to all of us and many of us remember him personally, so that further comment is unnecessary.

The fourth man was also a geologist who, for some five years after the completion of his work at Columbia College, was employed by the Geological Survey of New Jersey. During this time he seldom missed a meeting of the

Torrey Botanical Club, and his interest in botany, increased and encouraged by the Club, soon led to his determination to choose botany for his future career. Accordingly he accepted a minor position at Columbia College, was rapidly promoted to a professorship, and retired as professor emeritus at the early age of thirty-seven. His name was Nathaniel Lord Britton, and his retirement from the educational field was only to enable him to devote his tireless energy to the development of the New York Botanical Garden. It was his understanding and vision which led to the building of a scientific institution rather than a specialized park, to the accumulation of a great herbarium and a splendid taxonomic library, and through them to the provision of opportunity for taxonomic research by two score members of his staff, by some hundreds of visiting taxonomists, and through the loan of herbarium material by still more botanists in all parts of the world. In this place and before this audience we do not need to dwell on the taxonomic achievements of Britton. They are well known to all of us. But let us remember, as Britton himself remembered, that to the Torrey Botanical Club he owed his botanical inspiration and that to the Club he returned his thanks by his final generous provision for its permanent endowment.

Fifth and last is a physician, Henry Hurd Rusby, whose name first appears in the *BULLETIN* of the Torrey Club in 1878. So interested in botany was he that even before he completed his medical education he had spent much time collecting plants in the southwest, and soon after receiving his medical degree he left for South America to explore for medicinal plants; a search which was successful, as we all know. This mixture of botany and medicine made of him a pharmacognocist. During the remainder of his long life, 42 years of which were spent as professor and dean at the New York College of Pharmacy, he had every incentive to devote his energies entirely to pharmaceutical education and the fight for pure food and drugs, in which he took a prominent part. Without doubt, it was the enthusiasm which he drew from the Torrey Club which led him to continue botany as his hobby and to devote to it every possible minute which he could save from his regular work. Even in his last decade, when failing eyesight made botanical work exceedingly difficult, he continued to study his collections and to write short articles.

In 1887 Rusby had before him his extensive collections of South American plants, largely made by himself but supplemented by many sheets from the older Bolivian collectors Mandon and Bang. None of them was named; comparative material was scanty in the herbarium of Columbia College, and even current literature was poorly represented in the Columbia library. So far as North American botanists were concerned, South America was almost terra incognita. Undismayed by the difficulty of the task, Rusby set to work on these plants and also enlisted the aid of the rapidly rising young botanist, N. L. Brit-



ton. Rusby made three later trips to South America and never lost his interest in its flora. Neither did Britton, although he delegated most of the work to others, returning to it personally only in his later years and especially after his retirement in 1929.

These studies of the flora of South America grew and spread to other American institutions and are primarily responsible for all our present interest in South American botany. The important taxonomic work of Johnston and Smith of the Arnold Arboretum, Moldenke of the New York Botanical Garden, Killip of the National Herbarium, Pennell of the Philadelphia Academy of Sciences, Standley of the Field Museum and several others, have all evolved directly or indirectly from the initial work of Rusby.

Rusby's career as a taxonomist was peculiar. I fail to find that he ever contributed to the general theory of classification, that he ever wrote a taxonomic monograph, that he was ever a leader in taxonomic thought. But Rusby was a two-fisted fighter, absolutely fearless of consequences to himself, who fought adulterated food and impure drugs with the same intrepidity that he faced the Amazonian jungles, who never admitted defeat and who seldom was defeated. And here again I fail to find that he ever fought for a questionable cause or for his own personal advantage. Instead he was a champion of the right, as he understood it, and his understanding was correct.

Rusby was among the earliest to agitate for a botanical garden in the City of New York and one of the leaders in the struggle for the necessary mandatory legislation at Albany. Later the directorship of the newly chartered garden was in controversy and it was Rusby more than any other one person who fought and worked to prevent the office from being merely another political plum and to effect the appointment of N. L. Britton.

It has been my desire to express here my admiration and respect for one of our former members, but my words are too feeble for my thoughts. Henry Hurd Rusby has gone from among us, but the results of his influence, his energy, and his courage continue and widen from year to year.

Finally and in summary: The Torrey Botanical Club has not merely served as a publishing agency, but it has also produced men, and these men, by their additions to knowledge, by their provision of opportunity, by their influence on modern thought, have been the chief contribution of the Club toward the advancement of taxonomy. Let us hope that the Club will be equally useful during the next seventy-five years.